

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Hiroomi HANAI ) Group Art Unit Unknown  
 )  
 Appl. No. : Unknown )  
 )  
 Filed : Herewith )  
 )  
 For : MANUFACTURING METHOD )  
 OF CERAMIC GREEN SHEET, )  
 MANUFACTURING METHOD )  
 OF MULTILAYER CERAMIC )  
 ELECTRONIC )  
 COMPONENTS, AND )  
 CARRIER SHEET FOR )  
 CERAMIC GREEN SHEETS )  
 )  
 Examiner : Unknown )

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents  
 Washington, D.C. 20231

Dear Sir:

Preliminary to examination on the merits, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Please replace the paragraph beginning at page 12, line 6, with the following rewritten paragraph:

-- Figure 4 (a) and Figure 4 (b) show a sectional view of the ceramic green sheet laminated body in which a ceramic green sheet and a carrier sheet are manufactured separately; and --

Please replace the paragraph beginning at page 12, line 9, with the following rewritten paragraph:

-- Figure 5 (a) to Figure 5 (c) show a sectional view of the ceramic green sheet laminated body in which a ceramic green sheet and a carrier sheet are manufactured separately. --

Please replace the paragraph beginning at page 23, line 22, with the following rewritten paragraph:

-- As shown in Figure 4 (a), Figure 4 (b) or Figure 5 (a) to Figure 5 (c), the ceramic green sheet 2 formed on the carrier sheet 1 shown in Figure 3 is laminated onto other ceramic green sheets, and a ceramic green sheet laminated body is formed. Then, the carrier sheet 1 is separated from the ceramic green sheet 2 after heat-treatment or UV irradiation processing. Convenient equipments may be used for heating or UV irradiation. --

Please replace the paragraph beginning at page 24, line 19, with the following rewritten paragraph:

-- Moreover, a method may be mentioned in which the ceramic green sheet 2 is piled up on the ceramic green sheet 3 as a substrate and subsequently the laminated body is adhered by pressure and heat (further irradiated with UV), and thereby the carrier sheet 1 is separated while the ceramic green sheet 2 is transferred and laminated, as shown in Figure 5 (b) and Figure 5 (c). Then, this operation is repeated successively; electrode patterns are located with sufficient accuracy, further repeatedly adhered by pressure and heat, and thus the ceramic green sheets 2 are laminated. Although conditions of adhering by pressure and heat are not especially limited, conditions of about 20 to 50 degrees C and  $1 \times 10^5$  to  $1 \times 10^8$  Pa are usually adopted. --

IN THE CLAIMS:

**Please amend claims 3-6, 8 and 9 as follows:**

3. (Amended) The manufacturing method of the ceramic green sheet according to Claim 1, wherein the adhesive layer separable by being heated comprises thermal expandable fine particles.

4. (Amended) The manufacturing method of the ceramic green sheet according to Claim 1, wherein a dynamic modulus of elastic of an adhesive forming the adhesive layer separable by being heated is in a range of  $5 \times 10^3$  to  $1 \times 10^6$  Pa at a temperature of 23 degrees C to 150 degrees C.

5. (Amended) The manufacturing method of the ceramic green sheet according to Claim 1, wherein the adhesive layer separable by being heated comprises a side chain crystalline resin.

6. (Amended) The manufacturing method of the ceramic green sheet according to Claim 1, wherein an adhesive strength to stainless steel of the adhesive layer separable by being heated

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is more than 0.1 N / 20mm at ordinary temperature (23 degrees C) and is no more than 0.1 N / 20mm when heated.

8. (Amended) A manufacturing method of a multilayer ceramic electronic component comprising steps of;

laminating a ceramic green sheet onto other ceramic green sheets, after manufacturing the ceramic green sheet by manufacturing method according to Claim 1,

and separating the carrier sheet from the ceramic green sheet by being heated or irradiated with UV.

9. (Amended) A carrier sheet for ceramic green sheets used for the manufacturing method of the ceramic green sheet according to Claim 1, comprising an adhesive layer separable by being heated or an adhesive layer separable by being cured with UV on one side of a base film.

**Please add the following claims:**

11. (New) A carrier sheet for ceramic green sheets used for the manufacturing method of the multilayer ceramic electronic component according to Claim 8, comprising an adhesive layer separable by being heated or an adhesive layer separable by being cured with UV on one side of a base film.

12. (New) The manufacturing method of the ceramic green sheet according to Claim 1, wherein a dynamic modulus of elastic of an adhesive forming the adhesive layer separable by being heated is in a range of  $5 \times 10^4$  to  $8 \times 10^5$  Pa at a temperature of 23 degrees C to 150 degrees C.

13. (New) The manufacturing method of the ceramic green sheet according to Claim 1, wherein an adhesive strength to stainless steel of the adhesive layer separable by being heated is more than 0.2 N / 20mm at ordinary temperature (23 degrees C) and is no more than 0.05 N / 20mm when heated.

14. (New) The manufacturing method of the ceramic green sheet according to Claim 1, wherein an adhesive strength at ordinary temperature (23 degrees C) to stainless steel of the adhesive layer separable by being cured with UV is more than 0.2 N / 20mm before UV irradiation and no more than 0.05 N / 20mm after UV irradiation.

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IN THE DRAWINGS:

As stated in the attached Request for Approval of Drawing Changes, Applicant has requested to amend Figures 4 and 5 to indicate separately each drawing, as shown in the attached copy of the figures wherein the correction is indicated with red ink.

REMARKS

The claims have been amended to conform to U.S. practice by changing the multiple-dependent claims to single-dependent claims. Claims 11-14 have been added. Support for Claim 12 can be found on page 7, for example. Support for Claim 13 can be found on page 8, for example. Support for Claim 14 can be found on page 10, for example. Additionally, drawing numbers have been amended to comply with the U.S. practice. The drawings also have been amended to comply with the U.S. practice. As such, no new matter has been added. Attached hereto is a marked-up version of the changes made to the claims and specification by the current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE." Entry of the amendments is respectfully requested.

Should there be any questions concerning this application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 5, 2002

By: 

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

Paragraph beginning at line 6 of page 12 has been amended as follows:

Figure 4 (a) and Figure 4 (b) shows a sectional view of the ceramic green sheet laminated body in which a ceramic green sheet and a carrier sheet are manufactured separately; and

Paragraph beginning at line 9 of page 12 has been amended as follows:

Figure 5 (a) to Figure 5 (c) shows a sectional view of the ceramic green sheet laminated body in which a ceramic green sheet and a carrier sheet are manufactured separately.

Paragraph beginning at line 22 of page 23 has been amended as follows:

As shown in Figure 4 (a), Figure 4 (b) or Figure 5 (a) to Figure 5 (c), the ceramic green sheet 2 formed on the carrier sheet 1 shown in Figure 3 is laminated onto other ceramic green sheets, and a ceramic green sheet laminated body is formed. Then, the carrier sheet 1 is separated from the ceramic green sheet 2 after heat-treatment or UV irradiation processing. Convenient equipments may be used for heating or UV irradiation.

Paragraph beginning at line 19 of page 24 has been amended as follows:

Moreover, a method may be mentioned in which the ceramic green sheet 2 is piled up on the ceramic green sheet 3 as a substrate and subsequently the laminated body is adhered by pressure and heat (further irradiated with UV), and thereby the carrier sheet 1 is separated while the ceramic green sheet 2 is transferred and laminated, as shown in Figures 5 (b) and Figure 5 (c). Then, this operation is repeated successively; electrode patterns are located with sufficient accuracy, further repeatedly adhered by pressure and heat, and thus the ceramic green sheets 2 are laminated. Although conditions of adhering by pressure and heat are not especially limited, conditions of about 20 to 50 degrees C and  $1 \times 10^5$  to  $1 \times 10^8$  Pa are usually adopted.

**IN THE CLAIMS:**

Claims 3-6, 8 and 9 have been amended as follows:

3. (Amended) The manufacturing method of the ceramic green sheet according to Claim 1-or-2, wherein the adhesive layer separable by being heated comprises thermal expandable fine particles.

4. (Amended) The manufacturing method of the ceramic green sheet according to any one of Claims 1-to-3, wherein a dynamic modulus of elastic of an adhesive forming the adhesive

layer separable by being heated is in a range of  $5 \times 10^3$  to  $1 \times 10^6$  Pa at a temperature of 23 degrees C to 150 degrees C.

5. (Amended) The manufacturing method of the ceramic green sheet according to ~~any one of Claims 1 to 4~~, wherein the adhesive layer separable by being heated comprises a side chain crystalline resin.

6. (Amended) The manufacturing method of the ceramic green sheet according to ~~any one of Claims 1 to 5~~, wherein an adhesive strength to stainless steel of the adhesive layer separable by being heated is more than 0.1 N / 20mm at ordinary temperature (23 degrees C) and is no more than 0.1 N / 20mm when heated.

8. (Amended) A manufacturing method of a multilayer ceramic electronic component comprising steps of;

laminating a ceramic green sheet onto other ceramic green sheets, after manufacturing the ceramic green sheet by manufacturing method according to ~~any one of Claims 1 to 7~~,

and separating the carrier sheet from the ceramic green sheet by being heated or irradiated with UV.

9. (Amended) A carrier sheet for ceramic green sheets used for the manufacturing method of the ceramic green sheet according to ~~any one of Claims 1 to 7 or for the manufacturing method of the multilayer ceramic electronic component according to Claim 8~~, comprising an adhesive layer separable by being heated or an adhesive layer separable by being cured with UV on one side of a base film.

Claims 11-14 have been added.